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H. A. BENZEL

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DEMAND REGULATOR

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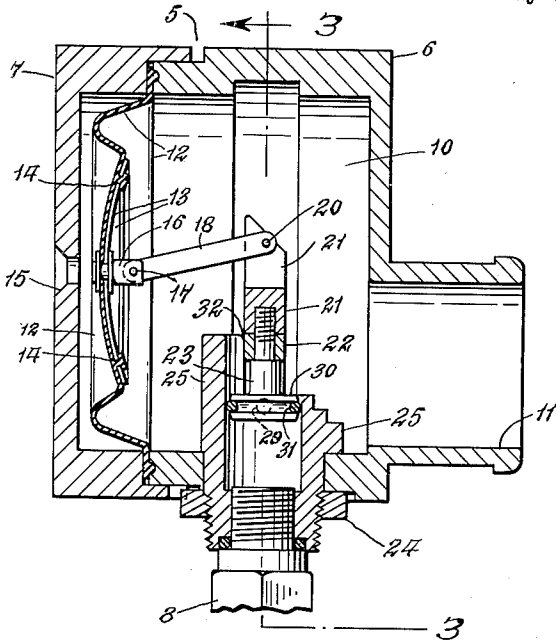


Fig. 1.

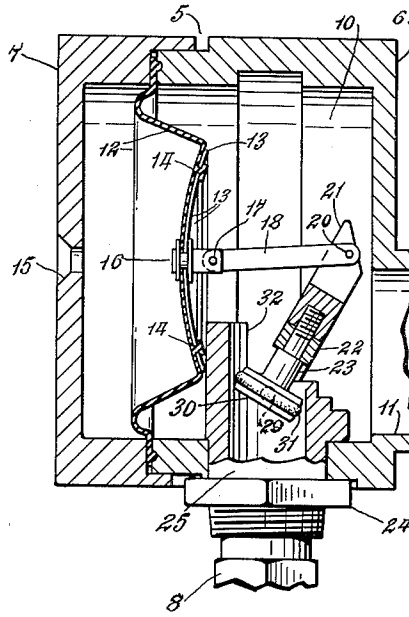


Fig. 2.

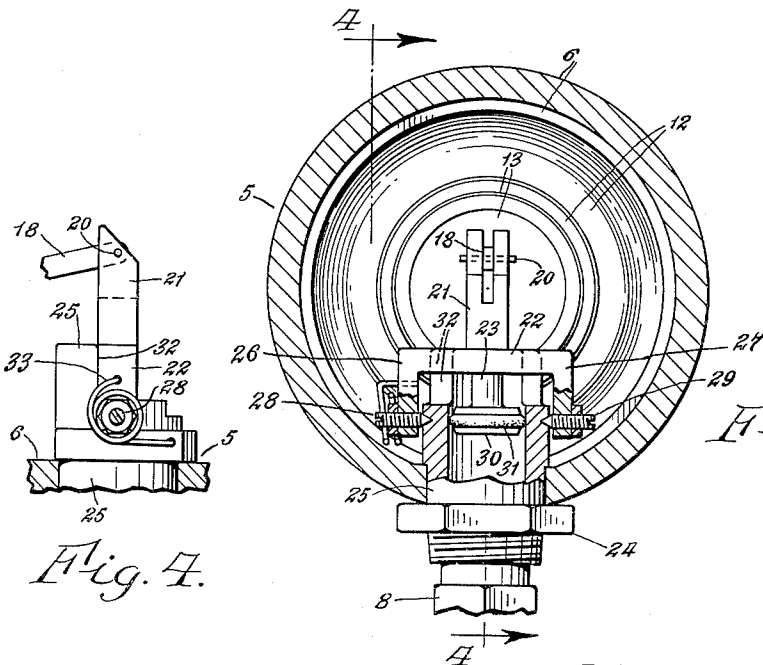


Fig. 3.

Fig. 4.

INVENTOR.

Howard A. Benzel

BY

Walter H. Popp.
Attorney.

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DEMAND REGULATOR

Howard A. Benzel, Lancaster, N.Y., assignor to Scott Aviation Corporation, Lancaster, N.Y., a corporation of New York

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2 Claims. (Cl. 137-63)

This invention relates to a regulator for automatically supplying artificial breathing fluid to a person whenever he inhales, and in whatever amount he desires, i.e., it supplies breathing fluid "on demand" and at whatever volume of flow is "demanded" by him.

The main object of the invention is to provide a demand regulator which does not have to be "cracked open," i.e., which provides a flow of breathing fluid the moment the inhalation pressure drops a very slight amount below the ambient pressure. Other collateral objects of the invention and practical solutions thereof are explained in the following specification and illustrated in the accompanying drawing, wherein:

FIG. 1 is a vertical, longitudinal section thru the demand regulator showing the butterfly demand valve 30 in its closed position.

FIG. 2 is a similar, vertical, longitudinal section thru the demand regulator but showing the butterfly demand valve 30 in its fully opened position.

FIG. 3 is a vertical, transverse section thru the demand regulator, taken in line 3-3 FIG. 2.

FIG. 4 is a fragmentary, vertical, longitudinal section showing the exterior of the butterfly demand valve 30, taken on line 4-4 FIG. 3.

For the sake of brevity this invention will be described precisely as it is illustrated, but it is to be understood that the scope of the invention is to be measured solely by the breadth of the appended claims and by the intrinsic novelty or "spirit" of the invention.

The casing 5 of the demand regulator here illustrated consists of a main casing body 6 and a cover 7, both of which are of cylindrical shape arranged on a horizontal, longitudinal axis. Compressed air (or other breathing fluid) is supplied to the demand regulator thru a pipe nipple 8, the latter being connected to a supply of compressed air, such as a compressed air tank, not shown. Air from a breathing compartment 10 leaves the demand regulator thru an outlet duct 11 from whence it passes either to a breathing mask (not shown) or directly into the mouth of the wearer.

Arranged between the cover 7 and the main casing body 6 is a pressure sensitive member which, as illustrated, is a flexible diaphragm 12 to which is molded a sheet-metal backing plate 13 that is annularly perforated adjacent its periphery by a series of holes 14 thru which the material of the diaphragm 12 passes during the molding process, thereby firmly securing said backing plate 13 to said diaphragm 12.

The cover 7 is perforated at 15 so that the outer face of the diaphragm 12 is exposed to ambient pressure, while its inner face is exposed to whatever pressure exists in the breathing compartment 10. Secured to the central part of the backing plate is a horizontal, longitudinal, inwardly extending stud 16 which is pivoted at 17 to the outer end of a link 18. The latter is pivoted at 20 to the upper, bifurcated end of an upstanding

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post 21 which is secured to the central part of a horizontal, transverse, cross yoke 22 by a stud screw 23 which is shouldered against the lower substantially horizontal face of the yoke 22.

Secured to the lower part of the main casing body 6 by a clamp nut 24 is a vertical, tubular, balanced-valve housing 25 whose upper end is open and whose lower end is threaded, tubularly connected to aforesaid pipe nipple 8. The outer ends of the cross yoke 22 are integrally provided with a pair of depending legs 26 and 27 which are pivotally connected with the exterior of the valve housing 25 by a pair of pivot screws 28, 29 that are firmly held in their adjusted position by a suitable pair of lock nuts.

Formed integrally at the lower, distal end of the stud screw 23 is a disk-shaped, balanced, demand valve or butterfly valve 30 whose medial, horizontal, transverse diameter is axially in line with the common axis of the pivot screws 28, 29, so that as the cross yoke 22 is swung about the axis of said pivots, the butterfly valve 30 is correspondingly swung about its medial, horizontal, transverse diameter.

Inasmuch as this butterfly valve 30 is here being employed as a demand valve in a demand regulator, it is essential that it make an absolutely tight seal, when closed, with the bore of the cylindrical valve housing 25. To obtain this fluid tightness of said butterfly valve an annular groove is machined in the central part of its periphery and in this groove is arranged an O-ring 31 which may be composed of either some type of rubber or of other plastic material. It should be understood, however, that this matter of fluid tightness has nothing to do with the fact that the butterfly valve 30 is a balanced valve, i.e., any change of pressure on either of its faces, or any differential of pressures on its two opposite faces, does not tend to cause any rotation of said butterfly valve 30. It is inherently a "balanced" valve, and hence does not have to be "cracked open" like an ordinary demand valve but, instead, starts to open immediately when the pressure in breathing chamber 10 drops slightly below the ambient pressure in cover 7.

It is desirable that the fully closed position of the butterfly valve 30 be definitely limited relatively to the demand valve housing 25 rather than relatively to the casing 5 because in the latter case the addition of tolerances might result in improper "seating" of the butterfly valve. For this reason a stop 32 is formed on valve housing 25, said stop being adapted to take the thrust of the outer face of the yoke 22 when the butterfly valve is in completely closed position.

Said butterfly valve 30 is resiliently urged toward its closed position by a spiral spring 33 (see FIGS. 4 and 3) which is coiled around the lock nut of the pivot screw 28 and has its opposite ends received in a suitable hole drilled horizontally in the leg 26 of yoke 22 and in a suitable hole drilled horizontally in the butterfly valve housing 25.

I claim:

1. A demand regulator comprising: a casing having a breathing compartment; a pressure-sensitive member arranged in said casing and exposed on its one face to the pressure within said breathing compartment and exposed on its other face to the ambient atmosphere or other ambient medium; an open-ended, tubular housing connected

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with said casing and opening into the breathing compartment thereof; a balanced valve arranged within said housing but pivotally connected with the exterior thereof and adapted to discharge breathing fluid into said breathing compartment and operatively connected with said pressure-sensitive member; and means for supplying breathing fluid under pressure to said balanced valve.

2. A demand regulator as in claim 1 with the balanced valve being a butterfly valve which is secured to a yoke which is pivotally connected to the housing exteriorly thereof.

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